

Having described the invention, we claim:

1. A magnetic separator for spacing a plurality of workpieces aligned in a face-to-face relationship and moving through said separator, said separator comprising:

an upper guide plate and a lower guide plate that define a passage for workpieces moving through said separator;

said guide plates having respective inlet end portions that define an inlet opening for said passage and having respective outlet end portions that define an outlet opening for said passage,

said inlet opening of said passage being adapted to admit and align any misaligned workpieces moving into said inlet opening of said passage.
2. A separator as set forth in claim 1 wherein said inlet opening has a funnel-shaped configuration for receiving workpieces into said passage.
3. A separator as set forth in claim 2 wherein a portion of said inlet end portion of said upper guide plate is flared upward to form said funnel-shaped configuration.
4. A separator as set forth in claim 3 wherein said upper guide plate has a V-shaped wall, an end portion of which is bent upward into tabs to form said funnel-shaped configuration.

5. A separator as set forth in claim 1 wherein said passage has an intermediate portion disposed between said inlet opening and said outlet opening, said inlet opening being substantially larger in cross-sectional area than said intermediate portion of said passage.

6. A separator as set forth in claim 1 wherein said lower guide plate has an intermediate portion that extends between said inlet end portion and said outlet end portion of said lower guide plate, said inlet end portion of said lower guide plate extending parallel to said intermediate portion of said lower guide plate;

said upper guide plate having an intermediate portion that extends between said inlet end portion and said outlet end portion of said upper guide plate, said inlet end portion of said upper guide plate extending transverse to said intermediate portion of said upper guide plate.

7. A separator as set forth in claim 1 wherein one of said upper and lower guide plates has a view port for enabling viewing of said passage from a location other than said inlet opening and said outlet opening.

8. A separator as set forth in claim 1 further comprising an adjustment mechanism for adjusting the vertical position of said upper guide plate relative to said lower guide plate, said adjustment mechanism comprising a member that is rotatable about an axis, said rotatable member having a first portion connected for vertical movement with said upper guide plate and a second portion that is threadedly received in

a frame portion of said separator, rotation of said rotatable member about said axis causing axial movement of said rotatable member and thereby of said upper guide plate relative to said frame portion.

9. A separator as set forth in claim 1 further comprising an upper pole piece adjacent said upper guide plate and a lower pole piece adjacent said lower guide plate, said upper and lower pole pieces providing a magnetic field operative to orient workpieces in said passage; and

an adjustment mechanism for adjusting the vertical position of said upper pole piece relative to said upper guide plate, comprising a member that is rotatable about an axis, said rotatable member having a first portion connected for movement with said upper pole piece and a second portion that is threadedly received in said upper guide plate, rotation of said rotatable member about said axis causing axial movement of said upper pole piece relative to said upper guide plate.

10. A separator as set forth in claim 1 comprising a frame on which said upper guide plate is supported in a position extending longitudinally between an inlet end of said separator and an outlet end of said separator, a releasable mechanism supporting one end of said upper guide plate on said frame, said upper guide plate being slidable longitudinally along said frame to enable removal of said upper guide plate from said separator.

11. A magnetic separator for spacing a plurality of substantially plate-like workpieces in face-to-face relationship, said separator comprising:

an upper guide plate and a lower guide plate that define a passage for workpieces moving through said separator;

said guide plates having respective inlet end portions that define an inlet opening for said passage and respective outlet end portions that define an outlet opening for said passage,

one of said upper and lower guide plates having a view port for enabling viewing of said passage from a location other than said inlet opening and said outlet opening.

12. A separator as set forth in claim 11 wherein said view port is in said lower guide plate.

13. A separator as set forth in claim 12 wherein said view port is located near said inlet end portion of said lower guide plate.

14. A separator as set forth in claim 11 including an upper pole piece adjacent said upper guide plate and a lower pole piece adjacent said lower guide plate, said upper and lower pole pieces providing a magnetic field operative to orient workpieces in said passage;

said view port being located on said one guide plate to enable viewing of the associated pole piece to assist in positioning said pole piece vertically in said separator.

15. A separator as set forth in claim 11 wherein said view port is in said lower guide plate and is located near said inlet end portion of said lower guide plate.

16. A separator as set forth in claim 11 further comprising an adjustment mechanism for adjusting the vertical position of said upper guide plate relative to said lower guide plate, said adjustment mechanism comprising a member that is rotatable about an axis, said rotatable member having a first portion connected for vertical movement with said upper guide plate and a second portion that is threadedly received in a frame portion of said separator, rotation of said rotatable member about said axis causing axial movement of said rotatable member and thereby of said upper guide plate relative to said frame portion.

17. A separator as set forth in claim 11 further comprising an upper pole piece adjacent said upper guide plate and a lower pole piece adjacent said lower guide plate, said upper and lower pole pieces providing a magnetic field operative to orient workpieces in said passage; and

an adjustment mechanism for adjusting the vertical position of said upper pole piece relative to said upper guide plate, comprising a member that is rotatable about an axis, said rotatable member having a first portion connected for movement with said upper pole piece and a second portion that is threadedly received in said upper guide plate, rotation of said rotatable member about said axis causing axial movement of said upper pole piece relative to said upper guide plate.

18. A separator as set forth in claim 11 comprising a frame on which said upper guide plate is supported in a position extending longitudinally between an inlet end of said separator and an outlet end of said separator, a releasable mechanism supporting one end of said upper guide plate on said frame, said upper guide plate being slidable longitudinally along said frame to enable removal of said upper guide plate from said separator.

19. A separator as set forth in claim 11 wherein said inlet opening of said passage has a funnel-shaped configuration that is adapted to admit and align any misaligned workpieces moving into said inlet opening of said passage.

20. A magnetic separator for spacing a plurality of substantially plate-like workpieces in face-to-face relationship, said separator comprising:

an upper guide plate and a lower guide plate that define a passage for workpieces moving through said separator; and

an adjustment mechanism for adjusting the vertical position of said upper guide plate relative to said lower guide plate;

said adjustment mechanism comprising a member that is rotatable about an axis, said rotatable member having a first portion fixed for vertical movement with said upper guide plate and a second portion that is threadedly received in a frame portion of said separator, rotation of said rotatable member about said axis causing axial

movement of said rotatable member and thereby of said upper guide plate relative to said frame portion.

21. A separator as set forth in claim 21 wherein said rotatable member is a jack screw.

22. A separator as set forth in claim 20 wherein said upper guide plate is fixed for movement with a sub-frame that is slidable along an upright portion of a frame of said separator.

23. A separator as set forth in claim 22 comprising a plurality of adjustment fasteners that releasably secure said sub-frame to said upright portion of said frame, said adjustment fasteners having a first condition blocking movement of said upper guide plate, and a second condition allowing movement of said upper guide plate.

24. A separator as set forth in claim 20 wherein one of said upper and lower guide plates has a view port for enabling viewing of said passage from a location other than said inlet opening and said outlet opening.

25. A separator as set forth in claim 20 further comprising an upper pole piece adjacent said upper guide plate and a lower pole piece adjacent said lower guide plate, said upper and lower pole pieces providing a magnetic field operative to orient workpieces in said passage; and

an adjustment mechanism for adjusting the vertical position of said upper pole piece relative to said upper guide plate, comprising a member that is rotatable about an axis, said rotatable member having a first portion connected for movement with said upper pole piece and a second portion that is threadedly received in said upper guide plate, rotation of said rotatable member about said axis causing axial movement of said upper pole piece relative to said upper guide plate.

26. A separator as set forth in claim 20 comprising a frame on which said upper guide plate is supported in a position extending longitudinally between an inlet end of said separator and an outlet end of said separator, a releasable mechanism supporting one end of said upper guide plate on said frame, said upper guide plate being slidable longitudinally along said frame to enable removal of said upper guide plate from said separator.

27. A separator as set forth in claim 20 wherein said inlet opening of said passage has a funnel-shaped configuration that is adapted to admit and align any misaligned workpieces moving into said inlet opening of said passage.

28. A magnetic separator for spacing a plurality of substantially plate-like workpieces in face-to-face relationship, said separator comprising:

an upper guide plate and a lower guide plate that define a passage for workpieces moving through said separator;

an upper pole piece supporting an upper magnet adjacent said upper guide plate and a lower pole piece supporting a lower magnet adjacent said lower guide plate, said upper and lower magnets providing a magnetic field operative to orient workpieces in said passage; and

an adjustment mechanism for adjusting the vertical position of said upper pole piece relative to said upper guide plate, comprising a member that is rotatable about an axis.

29. A separator as set forth in claim 28 wherein said rotatable member has a first portion connected for movement with said upper pole piece and a second portion that is threadedly received in said upper guide plate, rotation of said rotatable member about said axis causing axial movement of said upper pole piece relative to said upper guide plate.

30. A separator as set forth in claim 29 wherein said rotatable member is an adjustment screw having a head that is accessible from the top of said separator.

31. A separator as set forth in claim 30 wherein said separator has a top cover with an opening for enabling access to said adjustment screw with a tool.

32. A separator as set forth in claim 28 wherein said adjustment mechanism comprises a first rotatable member for adjusting an inlet end portion of said upper pole

piece and a second rotatable member for adjusting an outlet end portion of said upper pole piece

33. A separator as set forth in claim 28 further comprising an adjustment mechanism for adjusting the vertical position of said upper guide plate relative to said lower guide plate, said adjustment mechanism comprising a member that is rotatable about an axis, said rotatable member having a first portion connected for vertical movement with said upper guide plate and a second portion that is threadedly received in a frame portion of said separator, rotation of said rotatable member about said axis causing axial movement of said rotatable member and thereby of said upper guide plate relative to said frame portion.

34. A separator as set forth in claim 28 wherein one of said upper and lower guide plates has a view port for enabling viewing of said passage from a location other than said inlet opening and said outlet opening.

35. A separator as set forth in claim 28 comprising a frame on which said upper guide plate is supported in a position extending longitudinally between an inlet end of said separator and an outlet end of said separator, a releasable mechanism supporting one end of said upper guide plate on said frame, said upper guide plate being slidable longitudinally along said frame to enable removal of said upper guide plate from said separator.

36. A separator as set forth in claim 28 wherein said inlet opening of said passage has a funnel-shaped configuration that is adapted to admit and align any misaligned workpieces moving into said inlet opening of said passage.

37. A magnetic separator for spacing a plurality of substantially plate-like workpieces in face-to-face relationship, said separator comprising:

an upper guide plate and a lower guide plate that at least partially define a passage for workpieces moving through said separator between an inlet end of said separator and an outlet end of said separator;

an upper pole piece adjacent said upper guide plate and a lower pole piece adjacent said lower guide plate, said upper and lower pole pieces providing a magnetic field operative to orient workpieces in said passage;

a frame on which said upper guide plate is supported in a position extending longitudinally between said inlet end of said separator and said outlet end of said separator; and

a mechanism releasably supporting said upper guide plate on said frame whereby said upper guide plate is slidable longitudinally along said frame to enable removal of said upper guide plate from said separator.

38. A separator as set forth in claim 37 wherein said mechanism includes a releasable mechanism supporting one end of said upper guide plate on said frame and a fastener securing another end of said upper guide plate on said frame.

39. A separator as set forth in claim 38 wherein said releasable mechanism includes a pin and slot mechanism.

40. A separator as set forth in claim 37 wherein said upper guide plate is removable from said separator upon removal of two fasteners.

41. A separator as set forth in claim 37 wherein said upper guide plate is removable from said outlet end of said separator.

42. A separator as set forth in claim 37 further comprising an adjustment mechanism for adjusting the vertical position of said upper guide plate relative to said lower guide plate, said adjustment mechanism comprising a member that is rotatable about an axis, said rotatable member having a first portion connected for vertical movement with said upper guide plate and a second portion that is threadedly received in a frame portion of said separator, rotation of said rotatable member about said axis causing axial movement of said rotatable member and thereby of said upper guide plate relative to said frame portion.

43. A separator as set forth in claim 37 wherein one of said upper and lower guide plates has a view port for enabling viewing of said passage from a location other than said inlet opening and said outlet opening.

44. A separator as set forth in claim 37 wherein said inlet opening of said passage has a funnel-shaped configuration that is adapted to admit and align any misaligned workpieces moving into said inlet opening of said passage.

45. A separator as set forth in claim 37 further comprising an upper pole piece adjacent said upper guide plate and a lower pole piece adjacent said lower guide plate, said upper and lower pole pieces providing a magnetic field operative to orient workpieces in said passage; and

an adjustment mechanism for adjusting the vertical position of said upper pole piece relative to said lower pole piece, comprising a member that is rotatable about an axis, said rotatable member having a first portion fixed in position vertically relative to a frame portion of said separator and a second portion that is threadedly received in said upper pole piece, rotation of said rotatable member about said axis causing axial movement of said upper guide plate relative to said frame portion.